Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

1. (Currently amended) A method for determining channel estimates at a receiver for a wireless communication system using orthogonal frequency division multiplexing (OFDM) over a plurality of OFDM subcarriers, the method comprising:

receiving training signals from one or more receive antennas;

computing an estimated channel impulse response from the received training signals by reference to a training sequence; and

adaptively truncating the estimated channel impulse response in the time domain to improve ~~the~~ a signal-to-noise ratio of the channel estimates.

2. (Original) The method of claim 1, wherein computing the estimated channel impulse response includes:

transforming time-domain samples of the training signals to subcarrier coefficients for each of the plurality of OFDM subcarriers;

converting the subcarrier coefficients to impulse coefficients using a training sequence; and

transforming the impulse coefficients to obtain the channel impulse response estimate in the time domain.

3. (Original) The method of claim 2, wherein the training sequence includes a zero component for a DC one of the plurality of OFDM subcarriers, and wherein converting the subcarrier coefficients to impulse coefficients includes interpolating the impulse coefficients for the OFDM subcarriers other than the DC subcarrier, thereby supplying an impulse coefficient at DC.

4. (Original) The method of claim 2, wherein the training sequence includes a zero component for a DC one of the plurality of OFDM subcarriers, the method further comprising:

subsequently to transforming the impulse coefficients to obtain the channel impulse response estimate in the time domain, estimating a DC offset from a plurality of samples near the tail of the time domain channel impulse response estimate; and

correcting the time domain channel impulse response estimate for the estimated DC offset.

5. (Original) The method of claim 1, wherein adaptively truncating the estimated channel impulse response includes:

computing a channel power function representing power received near a sample time;

estimating channel noise;

computing a cutoff time based on the channel power function and the channel noise estimate;

truncating the time domain channel impulse response estimate at the cutoff time; and

transforming the truncated time domain channel impulse response estimate to a frequency domain channel estimate.

6. (Original) The method of claim 5, wherein the channel power function is given by:

$$P_h[t] = \sum_{i=0}^{i_0} \sum_{n=0}^{M_r-1} \left| \hat{h}_n^0[(i+t) \bmod N] \right|^2 \text{, where:}$$

t is a time parameter measured in samples;

M_r is the number of receive antennas;

$\hat{h}_{n0}[i]$ is the time domain channel impulse response estimate;

N is the number of samples in a symbol period of the training sequence; and

i_0 is a filtering time.

7. (Original) The method of claim 6, wherein the channel noise is estimated by minimizing $P_h[t]$ over the time parameter t.

8. (Original) The method of claim 5, wherein truncating the time domain channel impulse response estimates includes applying a windowing function around the cutoff time.

9. (Original) The method of claim 5, wherein truncating the time domain channel impulse response estimate includes applying a timing correction determined from the channel power function.

10. (Original) The method of claim 9, wherein the timing correction is given by $\tau' = \arg\max_t P_h[t]$, , where $P_h[t]$ is the channel power function and the maximization is performed over all values of time parameter t.

11. (Original) The method of claim 10, wherein applying the timing correction includes cyclically shifting each of the time domain channel response estimate and the power function by τ' samples.

12. (Currently amended) The method of claim 1, wherein the ~~reciever~~ receiver is configured to receive packets complying with IEEE 802.11a.

13. (Original) The method of claim 1, wherein the receiver includes a plurality of receive antennas and wherein the steps of receiving, computing, and adaptively truncating are performed for each of the receive antennas.

14. (Currently amended) A method of channel estimation for a receiver of a multiple input, multiple output (MIMO) communication system wherein signals are transmitted using orthogonal frequency division multiplexing (OFDM) over a plurality of OFDM subcarriers, the method comprising:

receiving, at each of a plurality of receive antennas, training signals from a plurality of transmit antennas, wherein the signal from each transmit antenna includes a different subset of the plurality of OFDM subcarriers;

transforming the received training signals at each receive antenna to a plurality of impulse coefficients for that receive antenna, each impulse coefficient corresponding to a different one of the OFDM subcarriers; ~~and~~

for each of the receive antennas, computing a channel impulse response for one of the transmit antennas using the impulse coefficients for the subset of the OFDM subcarriers transmitted by the one of the transmit antennas; and

adaptively truncating the time domain channel impulse response estimate to improve the signal-to-noise ratio of the channel estimates.

15. (Original) The method of claim 14, wherein computing a channel impulse response for one of the transmit antennas includes:

transforming time-domain samples of the training signals to subcarrier coefficients for each of the plurality of OFDM subcarriers;

converting the subcarrier coefficients to impulse coefficients using a training sequence;

transforming the impulse coefficients to a channel impulse response estimate in the time domain.

16. (Original) The method of claim 15, wherein the training sequence includes a zero component for a DC one of the plurality of OFDM subcarriers, and wherein converting the subcarrier coefficients to impulse coefficients includes interpolating the impulse

coefficients for the OFDM subcarriers other than the DC subcarrier, thereby supplying an impulse coefficient at DC.

17. (Original) The method of claim 15, wherein the training sequence includes a zero component for a DC one of the plurality of OFDM subcarriers, the method further comprising:

subsequently to transforming the impulse coefficients to obtain the channel impulse response estimate in the time domain, estimating a DC offset from a plurality of samples near the tail of the time domain channel impulse response estimate; and

correcting the time domain channel impulse response estimate for the estimated DC offset.

18. (Canceled)

19. (Original) The method of claim 18, wherein adaptively truncating the time domain channel impulse response estimate includes:

computing a channel power function representing power received near a sample time;

estimating channel noise;

computing a cutoff time based on the channel power function and the channel noise estimate;

truncating the time domain channel impulse response estimate at the cutoff time; and

transforming the truncated time domain channel impulse response estimate to a frequency domain channel estimate.

20. (Original) The method of claim 19, wherein the channel power function is given by:

$$P_h[t] = \sum_{i=0}^{i_0} \sum_{n=0}^{M_r-1} \sum_{m=0}^{M_t-1} \left| \hat{h}_{nm}^{0}[(i+t) \bmod N] \right|^2 \text{, where:}$$

t is a time parameter measured in samples;

M_r is the number of receive antennas;

M_t is the number of transmit antennas;

$\hat{h}_{n0}[i]$ is the time domain channel impulse response estimate;

N is the number of subcarriers transmitted by one transmit antenna during the training sequence; and

i_0 is a filtering time.

21. (Original) The method of claim 20, wherein the channel noise is estimated by minimizing $P_h[t]$ over the time parameter t.

22. (Original) The method of claim 19, wherein truncating the time domain channel impulse response estimate includes applying a timing correction determined from the channel power function.

23. (Original) The method of claim 22, wherein the timing correction is given by $\tau' = \arg\max_t P_h[t]$, , where $P_h[t]$ is the channel power function and the maximization is performed over all values of time parameter t.

24. (Original) The method of claim 23, wherein applying the timing correction includes cyclically shifting each of the time domain channel response estimate and the power function by τ' samples.

25. (Currently amended) A method of tracking channel variations during receipt of a packet using one or more receive antennas, comprising:

determining an initial channel estimate from training data included in the packet;

identifying a received symbol in the packet, wherein the received symbol corresponds to an input symbol value that is not part of a training sequence;

estimating ~~an input~~ the input symbol value using the received symbol value and the initial channel estimate;

deriving a per-symbol channel estimate from the received symbol value and the estimated input symbol value; and

updating the initial channel estimate using the per-symbol channel estimate.

26. (Original) The method of claim 25, wherein updating the initial channel estimate includes applying a first order filter to the initial channel estimate and the per-symbol channel estimate.

27. (Original) The method of claim 25, wherein the packet is transmitted using a plurality of transmit antennas and received using a plurality of receive antennas, and wherein channel estimates are derived as a matrix for respective channels between each of the transmit antennas and each of the receive antennas.

28. (Original) The method of claim 25, wherein the packet is transmitted using orthogonal frequency division multiplexing (OFDM) over a plurality of OFDM subcarriers and wherein channel variations are tracked for each of the OFDM subcarriers.

29. (New) The method of claim 1, wherein adaptively truncating comprises filtering the estimated channel impulse response using a window filter in the time domain.

30. (New) The method of claim 1, wherein the receiver is configured to receive packets complying with IEEE 802.11a.

31. (New) The method of claim 1, wherein the receiver is configured to receive packets complying with IEEE 802.11.

32. (New) The method of claim 5, wherein truncating the time domain channel impulse response estimate includes applying a timing correction determined from the channel power function.

33. (New) The method of claim 14, wherein the signals comprise packets complying with IEEE 802.11a.

34. (New) The method of claim 14, wherein the signals comprise packets complying with IEEE 802.11.

35. (New) The method of claim 25, wherein the signals comprise packets complying with IEEE 802.11a.

36. (New) The method of claim 25, wherein the signals comprise packets complying with IEEE 802.11.

37. (New) A method for determining channel estimates at a receiver for a wireless communication system using orthogonal frequency division multiplexing (OFDM) over a plurality of OFDM subcarriers, the method comprising:

receiving training signals from one or more receive antennas;

computing an estimated channel response from the received training signals by reference to a training sequence; and

adaptively smoothing the estimated channel response in the frequency domain to improve a signal-to-noise ratio of the channel estimates.

38. (New) The method of claim 37, further comprising updating the estimated channel response within a packet based on received data symbols of the packet.

39. (New) The method of claim 37, further comprising:

after determining an initial channel estimate from the received training signals included in a packet, identifying a received OFDM data symbol in the packet;

estimating an input OFDM data symbol value using the received OFDM data symbol value and the initial channel estimate;

deriving a per-OFDM symbol channel estimate from the received OFDM data symbol value and the estimated input OFDM data symbol value; and

updating the initial channel estimate using the per-OFDM symbol channel estimate.

40. (New) The method of claim 37, wherein adaptively smoothing comprises truncating an estimated channel impulse response in the time domain and transforming the truncated channel impulse response estimate to the frequency domain.

41. (New) The method of claim 37, wherein adaptively smoothing comprises filtering an estimated channel impulse response using a window filter in the time domain and transforming the filtered channel impulse response estimate to the frequency domain..

42. (New) The method of claim 37, wherein the receiver is configured to receive packets complying with IEEE 802.11a.

43. (New) The method of claim 37, wherein the receiver is configured to receive packets complying with IEEE 802.11.

44. (New) The method of claim 37, wherein adaptively smoothing the estimated channel response includes:

computing a channel power function representing power received near a sample time;

estimating channel noise;

computing a cutoff time based on the channel power function and the estimated channel noise;

truncating the estimated channel impulse response in the time domain at the cutoff time; and

transforming the truncated time domain channel impulse response estimate to a frequency domain channel estimate.

45. (New) The method of claim 44, wherein the receiver is configured to receive packets complying with IEEE 802.11a.

46. (New) The method of claim 44, wherein the receiver is configured to receive packets complying with IEEE 802.11.

47. (New) A method of channel estimation for a receiver of a multiple input, multiple output (MIMO) communication system wherein signals are transmitted using orthogonal frequency division multiplexing (OFDM) over a plurality of OFDM subcarriers, the method comprising:

receiving, at each of a plurality of receive antennas, training signals from a plurality of transmit antennas, wherein the training signals comprise both an IEEE 802.11a standard preamble and a MIMO preamble;

transforming the received training signals at each receive antenna to a plurality of impulse coefficients for that receive antenna, wherein the plurality of impulse coefficients depend, at least in part, on the received MIMO preamble; and

for each of the receive antennas, computing a channel impulse response for one of the transmit antennas using the impulse coefficients, wherein computing a channel impulse response includes adaptively smoothing the channel impulse response in the frequency domain.

48. (New) The method of claim 47, wherein the training signals are training symbols arranged such that a legacy receiver can interpret the IEEE 802.11a standard preamble.

49. (New) The method of claim 47, wherein the training signals are training symbols arranged such that the MIMO preamble is transmitted following in time after the IEEE 802.11a standard preamble.

50. (New) The method of claim 47, wherein the MIMO preamble is transmitted over all transmitters using all subcarriers that are used for data.

51. (New) The method of claim 47, wherein the receiver receives the training signals from one of the transmit antennas while other transmit antennas are not transmitting.

52. (New) The method of claim 51, wherein the training signals from the one of the individual transmit antennas are IEEE 802.11a standard preambles.

53. (New) The method of claim 47, wherein the MIMO preamble includes two or more iterations of an IEEE 802.11a standard long training symbol.

54. (New) The method of claim 53, wherein the number of iterations is at least equal to the number of transmit antennas.

55. (New) The method of claim 53, wherein the number of iterations is inversely proportional to the number of subcarriers used per transmit antenna.

56. (New) The method of claim 53, wherein the number of iterations is a number sufficient to provide enough information for a reliable channel estimation.

57. (New) The method of claim 53, wherein the iterations are uncorrelated over different transmit antennas for each iteration.

58. (New) A method for transmitting, using a transmitter having a plurality of transmit antennas, training signals in a wireless communication system for use in determining channel estimates at a receiver for a wireless medium using orthogonal frequency division multiplexing (OFDM) over a plurality of OFDM subcarriers, the method comprising:

transmitting, at each of a plurality of transmit antennas, training signals comprising both an IEEE 802.11a standard preamble and a MIMO preamble, wherein the MIMO preamble is a preamble transmitted over two or more of the transmit antennas.

59. (New) The method of claim 58, wherein the training signals are training symbols arranged such that a legacy receiver can interpret the IEEE 802.11a standard preamble.

60. (New) The method of claim 58, wherein the MIMO preamble is transmitted following in time after the conventional 802.11a preamble.

61. (New) The method of claim 58, wherein the MIMO preamble is transmitted over all transmitters using all subcarriers that are used for data.

62. (New) The method of claim 58, wherein at least one transmit period exists during which one transmit antenna transmits its training signals while all other transmit antennas do not transmit signals.

63. (New) The method of claim 62, wherein the training signals from the one transmit antenna comprise an IEEE 802.11a standard preamble.

64. (New) The method of claim 58, wherein the MIMO preamble comprises, among possibly other fields, two or more iterations of an IEEE 802.11a standard long training symbol.

65. (New) The method of claim 64, wherein the number of iterations is at least equal to the number of transmit antennas.

66. (New) The method of claim 64, wherein the number of iterations is inversely proportional to the number of subcarriers used per transmit antenna.

67. (New) The method of claim 64, wherein the number of iterations is a number sufficient to provide enough information for a reliable channel estimation.

68. (New) The method of claim 64, wherein the iterations are uncorrelated over different transmit antennas for each iteration.

69. (New) A method for transmitting, using a transmitter having at least one transmit antenna, training signals in a wireless communication system for use in determining channel estimates at a receiver for a wireless medium using orthogonal frequency division multiplexing (OFDM) over a plurality of OFDM subcarriers, the method comprising:

transmitting, using the at least one transmit antenna, one or more training symbols usable by a receiver to estimate a channel response over a legacy set of OFDM subcarriers; and

transmitting, using the at least one transmit antenna, one or more additional training symbols usable for estimating channel response over an additional set of OFDM subcarriers.

70. (New) The method of claim 69, wherein the legacy set of OFDM subcarriers consists of the 52 subcarriers defined by the IEEE 802.11a standard.

71. (New) The method of claim 69, wherein the additional set of OFDM subcarriers comprises four subcarriers.

72. (New) The method of claim 69, wherein the training symbols transmitted over the legacy set of OFDM subcarriers are transmitted in a SIMO mode.

73. (New) The method of claim 72, wherein the number of transmit antennas is two or more and training signals transmitted over the legacy set of OFDM subcarriers are distinct over at least two of the transmit antennas.

74. (New) A method for determining channel estimates at a receiver for a wireless communication system using orthogonal frequency division multiplexing (OFDM) over a plurality of OFDM subcarriers, the method comprising:

receiving training signals from one or more receive antennas;

computing an estimated channel impulse response from the received training signals by reference to a training sequence, wherein the training sequence for each transmit antenna is such that the training symbols sent from any two of the plurality of transmit antennas differ only in a cyclic shift and the receiver is configured to receive such signals; and

adaptively smoothing the estimated channel impulse response in the frequency domain.